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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/531,215	04/13/2005	Petrus Cornelis Paulus Bouten	NL02 1006 US	7856

24738 7590 11/05/2007
PHILIPS ELECTRONICS NORTH AMERICA CORPORATION
INTELLECTUAL PROPERTY & STANDARDS
370 W. TRIMBLE ROAD MS 91/MG
SAN JOSE, CA 95131

EXAMINER

LAWSON, MATTHEW P

ART UNIT	PAPER NUMBER
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2871

MAIL DATE	DELIVERY MODE
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11/05/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/531,215

Applicant(s)

BOUTEN ET AL.

Examiner

Matthew P. Lawson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 August 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6, 7, 9, 11-14, 16-23 and 26-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 7, 9, 11-14, 16-23, and 26-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 16 August 2007 has been entered.

2. **Claims 1-4, 6, 7, 9, 11-14, 16-23, and 26-30** are pending in this application.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

4. **Claim 26** is objected to because of the following informalities: "the ratio E_I/E_{II} is E_I/E_I is in the range" should be corrected to read --the ratio E_I/E_{II} is in the range--.

Appropriate correction is required.

Response to Arguments

5. Applicant's arguments with respect to the claims have been considered but are moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claims 1-4, 6, 7, 9, 12, 16, 18-23, 27, 29 and 30** are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama, US PGPub. No. 2003/0184704 A1 in view of Hinata, US PGPub. No. 2001/0020985 A1 (cited in a previous Office Action).

9. Regarding claims 1-3, Akiyama discloses a flexible flat panel display comprising:
a. an electro-optical medium (liquid crystal layer 109),

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- b. a first substrate (107),
- c. a display substrate (104) positioned coplanar with said first substrate,
- d. a first spacer and a second spacer (108) positioned between said first substrate and said display substrate, with said first substrate, display substrate and first and second spacers defining a cell structure for containing said electro-optical medium; and
- e. a first layer (105) positioned substantially coplanar and adjacent to the first substrate, located between the first substrate and the electro-optical medium (Akiyama, Fig. 9B).

10. Specifically, Akiyama discloses the first and display substrates (104, 107) to have a thickness of 0.1mm (¶ [0095, 0106]), and the first and second layers (101, 105) to have a thickness of from 1 μm to 150 μm (¶ [0078, 0082, 0094]), which overlaps the claimed range for the thickness of the first and second layers.

11. Akiyama fails to disclose the first substrate to have a modulus of elasticity smaller than 1.5 GPa, and fails to expressly disclose the first layer to have a modulus of elasticity, E_I , larger than the modulus of elasticity, E_{II} , of the first substrate.

12. However, Hinata discloses a flexible flat panel display comprising a first substrate (4), wherein the first substrate has a modulus of elasticity smaller than 1.5 GPa (Hinata, Fig. 5). Specifically, the first substrate (4) of Hinata has a modulus of elasticity of between 1×10^4 and 1×10^8 N/m², or between 1×10^{-5} and 0.1 GPa, and preferably 7×10^6 N/m², or 7×10^{-3} GPa (Hinata, ¶ [0026]).

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13. Hinata also discloses a first layer (8a) positioned coplanar and adjacent to said first substrate (4), wherein the first layer has a modulus of elasticity larger than said first substrate (4). Specifically, the first layer (8a) of Hinata is disclosed to be formed of polycarbonate, polyester or polysulfone (Hinata, ¶ [0070]), which has a larger modulus of elasticity than that of the first substrate (4) of Hinata, as discussed above.

14. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the substrate of Hinata in the display of Akiyama, in order to prevent the formation of bubbles in the display (Hinata, ¶ [0008-0081]).

15. Regarding claims 4 and 12, claim 1 is unpatentable over Akiyama in view of Hinata as discussed above. Akiyama further discloses one or more layers (103, 106, 206) positioned substantially coplanar and adjacent to an upper and/or lower surface of said first substrate (107) and display substrate (106) (Akiyama, Fig. 13B).

16. Regarding claim 6, claim 1 is unpatentable over Akiyama in view of Hinata as discussed above. Akiyama further discloses the first layer (105) to be positioned nearest to the electro-optical medium and the first substrate (107) to be positioned furthest from the electro-optical medium (Akiyama, Fig. 9B, e.g.).

17. Regarding claim 7, claim 1 is unpatentable over Akiyama in view of Hinata as discussed above.

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18. Akiyama fails to expressly disclose the first layer to have a modulus of elasticity, E_I , larger than the modulus of elasticity, E_{II} , of the first substrate, and thusly fails to expressly disclose the ratio E_I/E_{II} to be larger than 20.

19. However, Hinata discloses the first layer (8a) to be a plastic film consisting of, for example, polycarbonate, polyacrylate, or polyether sulfone (¶ [0070]). Said first layer as disclosed by Hinata would thereby have a modulus of elasticity, E_I , of from 2 to 2.5 GPa, which would be larger than the modulus of elasticity, E_{II} , of the first substrate (i.e. 7×10^{-3} GPa) (¶ [0026]), and the ratio E_I/E_{II} of the layers as disclosed by Hinata would therefore be over 285, which is larger than 20.

20. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the substrate of Hinata in the display of Akiyama, in order to prevent the formation of bubbles in the display (Hinata, ¶ [0008-0081]).

21. Regarding claims 9 and 27, claim 1 is unpatentable over Akiyama in view of Hinata as discussed above. Akiyama further discloses the first substrate to be bendable into a radius of curvature of from 50 to 150mm (Akiyama, ¶ [0135]), which is included within the claimed ranges.

22. Regarding claim 16, claim 1 is unpatentable over Akiyama in view of Hinata as discussed above. Akiyama further discloses the cell structure to define a cell gap between the first substrate and display substrate (Akiyama, Fig. 2B, e.g.).

23. Regarding claims 18 and 20, claim 16 is unpatentable over Akiyama in view of Hinata as discussed above. Akiyama further discloses the flexible flat panel display to be configured to bend in a curvature, as discussed under claim 9 above.

24. Akiyama fails to expressly disclose ensuring a relative cell gap variation to be equal to or smaller than 5%, or in the range of from 5% to 0.1%.

25. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to minimize any variation of the cell gap (i.e. hold the relative cell gap variation to be zero) in a flexible flat panel display adapted to bend in a curvature, such as one taught by Akiyama in view of Hinata, since it would have been well known to one of ordinary skill in the art at the time the invention that a variation of the cell gap causes undesirable display effects in a liquid crystal display device.

26. Regarding claim 19, claim 18 is unpatentable over Akiyama in view of Hinata as discussed above.

27. Specifically, Akiyama discloses a cell gap having a thickness d , a first substrate having a thickness h of 0.1mm, first and second spacers having a distance L between them, and a radius of curvature R of from 50 to 150mm (Akiyama, Figs. 2B, 9B, 15, 30B e.g.; ¶ [0095, 0106, 0135]).

28. Akiyama fails to expressly disclose the relative cell gap variation to satisfy the claimed expression.

29. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the relative cell gap variation satisfy the claimed

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expression in the device of Akiyama in view Hinata, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

30. Regarding claim 21, claim 1 is unpatentable over Akiyama in view of Hinata as discussed above. Akiyama further discloses a plurality of first and second spacers (701) positioned between first and second substrates defining a plurality of cell structures there between (Akiyama, Figs. 30A,B).

31. Regarding claims 22 and 23, claim 1 is unpatentable over Akiyama in view of Hinata as discussed above. Akiyama further discloses the first substrate and display substrate to be transparent (§ [0103]).

32. Regarding claims 29 and 30, Akiyama discloses a flexible flat panel display comprising:

- a. an electro-optical medium (liquid crystal layer 109),
- b. a first substrate (107),
- c. a display substrate (104) positioned coplanar with said first substrate,
- d. a first spacer and a second spacer (108) positioned between said first substrate and said display substrate, with said first substrate, display substrate and first and second spacers defining a cell structure for containing said electro-optical medium; and

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e. a first layer (105) positioned substantially coplanar and adjacent to the first substrate, located between the first substrate and the electro-optical medium, wherein the first layer has a thickness of up to 80% of the total thickness of the first substrate and the first layer, and

f. a second layer (101) positioned substantially coplanar and adjacent to the display substrate, wherein the second layer has a thickness of up to 80% of the total thickness of the display substrate and the second layer (Akiyama, Fig. 9B).

33. Specifically, Akiyama discloses the first and display substrates (104, 107) to have a thickness of 0.1mm ($\mathbb{¶}$ [0095, 0106]), and the first and second layers (101, 105) to have a thickness of from 1 μ m to 150 μ m ($\mathbb{¶}$ [0078, 0082, 0094]), which overlaps the claimed range for the thickness of the first and second layers.

34. Akiyama fails to disclose the first substrate to have a modulus of elasticity smaller than 1.5 GPa, and fails to expressly disclose the first layer to have a modulus of elasticity larger than that of the first substrate.

35. However, Hinata discloses a flexible flat panel display comprising a first substrate (4), wherein the first substrate has a modulus of elasticity smaller than 1.5 GPa (Hinata, Fig. 5). Specifically, the first substrate (4) of Hinata has a modulus of elasticity of between 1×10^4 and 1×10^8 N/m², or between 1×10^{-5} and 0.1 GPa, and preferably 7×10^6 N/m², or 7×10^{-3} GPa (Hinata, $\mathbb{¶}$ [0026]).

36. Hinata also discloses a first layer (8a) positioned coplanar and adjacent to said first substrate (4), wherein the first layer has a modulus of elasticity larger than said first substrate (4). Specifically, the first layer (8a) of Hinata is disclosed to be formed of

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polycarbonate, polyester or polysulfone (Hinata, ¶ [0070]), which has a larger modulus of elasticity than that of the first substrate (4) of Hinata, as discussed above.

37. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the substrate of Hinata in the display of Akiyama, in order to prevent the formation of bubbles in the display (Hinata, ¶ [0008-0081]).

38. **Claims 11, 13, 14 and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama in view of Hinata, as applied to claim 1 above, and further in view of Hinata et al., US Pat. No. 6,812,974 B1 ("Pat. '974," cited in a previous Office Action).

39. Regarding claim 11, claim 1 is unpatentable over Akiyama in view of Hinata as discussed above.

40. Akiyama fails to expressly disclose the display substrate having a modulus of elasticity in the range of from 1.3 to 0.1 GPa.

41. However, Pat. '974 discloses a liquid crystal display device comprising a supporting member (i.e. display substrate) (37) of synthetic rubber (Pat. '974, Fig. 5; col. 12, lines 28-47). The synthetic rubber substrate as disclosed in Pat '974 is functionally equivalent to the silicone rubber substrate as disclosed by Hinata, and would therefore have a modulus of elasticity of from 1×10^{-5} to 0.1 GPa.

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42. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a transparent display substrate having a modulus of elasticity of from 1×10^{-5} to 0.1 GPa, as taught by Pat. '974, as a display substrate in the flexible flat panel display device of Akiyama in view of Hinata, in order to prevent the formation of a distortion pattern in the liquid crystal device (Pat. '974, Abstract).

43. The references fail to expressly teach the display substrate to have a modulus of elasticity of from 1.3 to 0.1 GPa.

44. However, the range for the modulus of elasticity of the display substrate as taught by the combination of Akiyama, Hinata and Pat. '974 overlaps the claimed range at 0.1 GPa.

45. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the first substrate so as to have a modulus of elasticity of from 1.3 to 0.1 GPa, in view of the display substrate as taught by the combination of Akiyama, Hinata and Pat. '974, since it has been held that in the case where claimed ranges overlap ranges disclosed by the prior art, a prima facie case of obviousness exists. See MPEP § 2144.05.

46. Regarding claims 13 and 17, claim 1 is unpatentable over Akiyama in view of Hinata as discussed above. Akiyama further discloses a second layer (101) positioned substantially coplanar and adjacent to the display substrate (104), wherein the second

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layer is positioned nearest the electro-optical medium and the display substrate is positioned furthest from the electro-optical medium (Akiyama, Fig. 9B).

47. Akiyama fails to expressly disclose said second layer to have a modulus of elasticity, E_{III} , and said display substrate to have a modulus of elasticity, E_{IV} , where said E_{III} is larger than E_{IV} .

48. However, Pat. '974 discloses a second layer (22b) positioned substantially coplanar and adjacent to the display substrate (37), wherein the second layer has a modulus of elasticity larger than that of said display substrate. Specifically, Pat. '974 discloses that it is preferable for the supporting member (i.e. display substrate) (37) to be more flexible than the second substrate (i.e. second layer) (22b), i.e. have a modulus of elasticity smaller than that of the supporting member (i.e. display substrate) (Pat. '974, col. 12, lines 43-55).

49. Pat. '974 also discloses the second layer to be a plastic film consisting of, for example, polycarbonate, polyacrylate, or polyether sulfone (Pat. '974, col. 6, lines 38-41). Said second layer as disclosed would thereby have a modulus of elasticity, E_{III} , of from 2 to 2.5 GPa, which would be larger than the modulus of elasticity, E_{IV} , of the display substrate as discussed under claim 11 above.

50. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a second layer positioned substantially coplanar and adjacent to the display substrate, wherein the second layer has a modulus of elasticity larger than that of said display substrate, as taught by Pat. '974, in the flexible

flat panel display device of Akiyama in view of Hinata, in order to prevent the formation of a distortion pattern in the liquid crystal device (Pat. '974, Abstract).

51. Regarding claim 14, claim 13 is unpatentable over the combination of Akiyama, Hinata and Pat. '974 as discussed above.

52. Akiyama fails to expressly disclose the ratio E_{III}/E_{IV} to be larger than 20.

53. However, Pat. '974 discloses the second layer to be a plastic film having a modulus of elasticity of from 2 to 2.5 GPa, as discussed under claim 13 above, and the display substrate to have a modulus of elasticity of from 1×10^{-5} to 0.1 GPa, as discussed under claim 11 above. Pat. '974 thereby discloses the ratio of E_{III}/E_{IV} to be larger than 20, overlapping the claimed ranges.

54. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the ratio E_{III}/E_{IV} to be larger than 20, as taught by Pat. '974, in the flexible flat panel display device of Akiyama in view of Hinata, in order to prevent the formation of a distortion pattern in the liquid crystal device (Pat. '974, Abstract).

55. **Claim 26** is rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama in view of Hinata, as applied to claim 1 above, and further in view of Nakanishi, 6,750,844 B2 (cited in a previous Office Action).

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56. Claim 1 is unpatentable over the combination of Akiyama and Hinata as discussed above.

57. Akiyama fails to expressly disclose the ratio E_I/E_{II} to be from 2 to 20.

58. However, Nakanishi discloses a flexible flat panel display device wherein a first flexible substrate is placed coplanar to another flexible substrate, wherein the modulus of elasticity of a first flexible substrate (i.e. E_{II}) is from .001% to 100%, preferably 0.001% to 10%, of the modulus of elasticity of another flexible substrate (i.e. E_I) (Nakanishi, ¶ [0046]), thereby teaching a ratio of the modulus of elasticities E_I/E_{II} to be from about 1000 to 1, and preferably from about 1000 to 10. The range as disclosed by Nakanishi overlaps the claimed range.

59. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a ratio of the modulus of elasticities to be from, for example, from about 1000 to 10, in the device of Hinata, so that the first layer can easily follow the flexing of the first substrate (Nakanishi, ¶ [0046]).

60. **Claim 28** is rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama in view of Hinata and Pat. '974, as applied to claim 13 above, and further in view of Nakanishi.

61. Claim 13 is unpatentable over the combination of Akiyama, Hinata and '974 as discussed above.

62. Akiyama fails to disclose the ratio E_{III}/E_{IV} to be from 2 to 20.

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63. However, Nakanishi discloses a flexible flat panel display device wherein a first flexible substrate is placed coplanar to another flexible substrate, wherein the modulus of elasticity of a first flexible substrate (i.e. E_{IV}) is from .001% to 100%, preferably 0.001% to 10%, of the modulus of elasticity of another flexible substrate (i.e. E_{III}) (Nakanishi, ¶ [0046]), thereby teaching a ratio of the modulus of elasticities E_{III}/E_{IV} to be from about 1000 to 1, and preferably from about 1000 to 10. The range as disclosed by Nakanishi overlaps the claimed range.

64. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a ratio of the modulus of elasticities to be from, for example, from about 1000 to 10, in the device as taught by the combination of Hinata and Pat. '974, so that the second layer can easily follow the flexing of the display substrate (Nakanishi, ¶ [0046]).

Cited Prior Art

65. Any prior art already made of record and not relied upon is considered pertinent to applicant's disclosure.

- i. US PGPub. Nos. 2001/0005255 A1 and 2001/0038435 A1 teach that it would be known to reduce cell gap variation in a display device.

Conclusion

66. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew P. Lawson whose telephone number is 571-

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272-9795. The examiner can normally be reached on Monday through Thursday from 8:00am to 6:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms, can be reached at 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew P. Lawson,
Examiner

MPL


ANDREW S. SCHUCHMAN
PATENT EXAMINER